IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Application of	:	Docket No:	OT-4328 US
Adams *et al.*	:	Date:	7/9/2009
Application No: 09/163,259	:	Examiner	E. Pico
Filing Date: 9/29/1998	:	Art Unit:	3654

Title: ELEVATOR SYSTEM HAVING DRIVE MOTOR LOCATED BETWEEN ELEVATOR CAR AND HOISTWAY SIDEWALL

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY

Sir:

Applicants provide this Reply in response to the final Office Action dated October 19, 2009 ("Office Action"). A Request for Continued Examination and an Information Disclosure Statement accompany this Reply. This Reply does not amend the application.

Claim Rejections – 35 USC § 103

The Office Action rejected the claims as being unpatentable over various references. As discussed in more detail below, these rejections were improper and must be withdrawn.

I. Aulanko in view of Lewis and Bianca

The Office Action rejected claims 1-6 and 19-23 as being unpatentable over EP 0710618 A2 ("Aulanko") in view of US 1477886 ("Lewis") and US 3101130 ("Bianca"). The rejection failed to establish *prima facie* obviousness for at least three reasons.

A. The Examiner Incorrectly Interpreted Lewis

Independent claims 1 and 19 describe an elevator system with a flat belt that "suspend[s] the elevator car and counterweight". Aulanko does not describe flat belts. Lewis describes the invention as being "generally applicable to belting … of the … elevator type." This cryptic description of "elevator type belting" **does not** support the Examiner's position that the Lewis belt is suitable for suspending a car and counterweight. Nowhere do the terms "car" and "counterweight" appear in Lewis. In fact, Lewis fails to provide any exemplary use of its inventive belt in an elevator.

Several factors support the point that the inventive Lewis belt relates to an application in an elevator other than suspending elevator cars and counterweights. First, elevator codes (*e.g.* ASME A-17.1) mandate the use of steel wire ropes in elevator suspension. Although code variances are possible, one of ordinary skill in the art would expect that seeking a variance related to such a safety critical component as a suspension rope would be difficult.

Secondly, steel wire rope and rubber coated fabric belts have quite different capabilities. Attachment 1 shows the tensile strengths of several exemplary steel wire ropes – with the lowest value being 85,000 psi (586 MPa). A quick search on the internet shows, in Attachment 2, the tensile strengths of several exemplary nylon rubber belts – with the highest value being 0.47 MPa (19 kg/cm x 1cm x 9.81 m/s^2 / (0.0039m x 0.1m)). In other words, the exemplary steel

wire rope is significantly stronger (**over 1200 times stronger**) than the exemplary nylon rubber belt.

The more likely application of the Lewis belt is on other components of an elevator system, such as a door operator. Opening elevator doors involves less weight, and is not as safety critical as a suspension rope.

For at least this reason, the rejection was improper and must be withdrawn.

B. No Motivation to Combine Aulanko and Lewis

The Lewis invention "relates to new and useful improvements in rubber belting" (p. 1, ll. 18 and 19). Specifically, the Lewis invention makes two improvements to the rubber belt art - "the particular manner in which the fabric is woven" and "the particular material from which the fabric is made" (p. 1, ll. 41-45). In other words, Lewis merely describes the benefits of moving from the use of conventional rubber belts to the use of the inventive rubber belt having a new fabric material (jute) woven in a new (tighter) pattern. Lewis lacks any suggestion for the replacement of steel wire ropes with flat belts.

For at least this reason, the rejection was improper and must be withdrawn.

C. No Reasonable Expectation of Success

Given the disparate strengths of steel wire rope and rubber coated fabric belts, one of ordinary skill in the art would not expect any success in combining Aulanko and Bianca. As discussed above, the exemplary rubber belt is significantly less strong (over 1200 times less strong) than the exemplary steel wire rope. No one of ordinary skill in the art, when viewing the

cited references, would have been motivated to substitute a steel wire rope with a rubber belt as proposed by the Examiner.

For at least this reason, the rejection was improper and must be withdrawn.

D. No Motivation to Combine Aulanko and Bianca

Aulanko describes an elevator machine mounted to a beam (20) secured to the top of the rails (10, 11). Bianca describes an elevator system with the machine mounted on the counterweight. Bianca proposes this design as an improvement over machines mounted in a machine room (*see* Figure 1) or in the pit of the hoistway (*see* Figure 2).

Since Aulanko does not suffer any of the issues of the prior arrangements described in Bianca, Bianca provides no valid motivation for modifying Aulanko. In fact, Aulanko is itself a solution to moving an elevator machine from a machine room. As such, no motivation exists to modify Aulanko.

The motivation alleged in the Office Action is suspect – and is likely an attempt to use improper hindsight. The Examiner states that the motivation to combine Aulanko and Bianca is "to provide simplification and reduction of the cable guidance." This is incorrect. Bianca does not provide simplification or reduction of the cable guidance. Figure 1 of Aulanko displays four rope drops – (1) from beam to counterweight sheave; (2) counterweight sheave to machine; (3) machine to underneath car; and (4) underneath car to anchorage at top of hoistway. No embodiment in Bianca is simpler than the roping arrangement in Aulanko. At worst, Bianca has

more rope drops (6 – *see* Figure 5). At best, Bianca has the same number of rope drops (*see* Figures 3 and 4). Without a benefit, no motivation exists to combine Aulanko and Bianca.

For at least this reason, the rejection was improper and must be withdrawn.

E. Bianca Renders Aulanko Unsuitable for Its Intended Purpose

Aulanko states that prior machines are "rather large" and that "a large distance has to be provided between the cabin path and the shaft wall." The inventive concept of Aulanko is a machine "of a flat construction as compared to its width". This flat construction "allows efficient utilisation of the cross-sectional area of the elevator shaft". As the Examiner recognizes on pages 2 and 3 of the Office Action, Aulanko fails to describe the drive sheave axis of rotation being parallel to the sidewall of the hoistway.

As discussed above, Bianca describes an elevator system with the machine mounted on the counterweight. Bianca neither describes nor suggests a reduction in the amount of space used by the machine in the hoistway. In fact, the Figures (*e.g.* Figures 3, 5 and 6) show the same amount of space used by the inventive arrangement compared to prior arrangements (*e.g.* Figures 1 and 2).

Combining Aulanko with the non-space efficient concept of Bianca would render Aulanko unsuitable for its intended purpose – "efficient utilisation of the cross-sectional area of the elevator shaft" by using a "flat" machine.

In light of the multiple reasons discussed above, Applicants request that the Examiner reconsider and withdraw this rejection.

II. Aulanko in view of Lewis, Bianca and Hakala

The Office Action rejected claim 8 under 35 USC § 103 as being obvious over Aulanko in view of Lewis and Bianca, further in view of U.S. Patent number 5,469,937 (hereinafter "Hakala"). As discussed above, the rejection of independent claims 1 and 19 was improper. For at least this reason, the rejection of dependent claim 8 must be withdrawn. Hakala and the remaining art of record fail to overcome the shortcomings of Aulanko, Lewis and Bianca. Applicants request that the Examiner reconsider and withdraw this rejection.

Conclusion

Applicants assert that the present application defines an invention that is patentable over the cited references. Applicants request that the Examiner reconsider and withdraw the rejections, and provide a notice of allowability in the next communication.

In the event of any underpayments or overpayments with the Credit Card Authorization accompanying this paper, Applicants authorize the Commissioner to charge or credit any such underpayments or overpayments for fees under 37 CFR §§ 1.16 or 17 to **Deposit Account Number 15-0750**, Order Number OT-4328.

Respectfully submitted,

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Enclosures

ATTACHMENT
1

ELEVATORS

ELECTRIC AND ELECTROHYDRAULIC ELEVATORS,
ESCALATORS, MOVING SIDEWALKS,
AND RAMPS

by F.A. Annett

Third Edition
290 Illustrations

McGRAW-HILL BOOK COMPANY
New York Toronto London
1960

AN ELEVATOR WORLD LIMITED EDITION
1989

CHAPTER 17

Ropes, Their Construction, Inspection, and Care[1]

Metals Used in Wire Ropes. Wire rope is an important part of electric-elevator equipment. It connects the car and counterweights with the hoisting machine and overspeed governor to the car safety devices. Therefore the car's operation and the passengers' safety depend upon wire rope. For this reason those responsible for elevator operation should be familiar with wire-rope constructions and factors affecting its service and safety.

Wire rope is made in a great variety of forms and of many materials. Although generally made of some grade of iron or steel, Monel metal, bronze, and other metals are used for special conditions. For example, Monel-metal rope is a noncorrosive type, suited for wet places, such as meat-packing houses or places where chemical fumes or salt in the atmosphere would destroy iron or steel rope.

The material used in so-called iron rope is a very mild steel, containing about 0.1 per cent carbon. It is comparatively soft, ductile, and of low tensile strength. Wire of this material for rope construction has a tensile strength of about 85,000 psi.

What is known as traction steel, a form of toughened mild steel containing about 0.35 per cent carbon, is used extensively for traction-type elevator ropes. This material has a tensile strength in the wire of about 150,000 to 170,000 psi. Cast steel, the first of the so-called higher-carbon steels, frequently called crucible steel, is another common material used in wire-rope construction. It is one of the most ductile of the high-carbon steels, and has a tensile strength in the wire of from 170,000 to 220,000 psi. Three other steels,

[1] For assistance in the preparation of this chapter the author is indebted to the American Cable Company, the American Wire & Steel Company, John A. Roebling's Sons Company, Hazard Wire Rope Company, A. Leschen & Sons Rope Company, Williamsport Wire Rope Company, Broderick & Bascom Rope Company, MacWhyte Wire Rope Company, and the Bethlehem Steel Company.

designated as mild-plow, plow, and improved-plow are in common use for wire-rope construction. They have a tensile strength in the wire of about 220,000 to 280,000 psi. These and others, appearing under various trade names, are mostly some form of open-hearth steel.

Of the various materials for wire-rope construction, iron and mild steel are about the only ones used for elevator ropes. Mild-steel ropes frequently appear under the trade name of traction steel or other designations.

Rope Constructions. After the wire has been drawn to size and heat-treated to give it the desired qualities, it is ready to be formed into rope. Rope-making consists of twisting a given number of wires into a strand and laying a number of these strands about a hemp center. In some cases, for use on dead loads, disk conveyors, and hot-metal cranes, a wire center is used. Tiller rope and mooring line have strands made with hemp centers. In general the

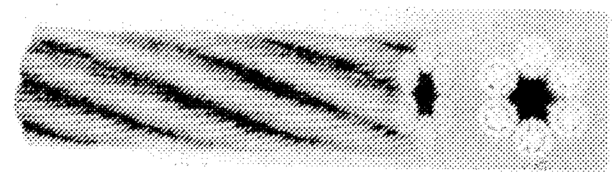

FIG. 17-1. Regular 6 x 19 wire-rope construction.

strands are laid around a central wire, although in some constructions they have centers of special forms.

Combinations of wires, their sizes in a strand, and the number of strands in a rope are almost unlimited. There are on the market about 80 different constructions varying from 3 to 91 wires in a strand and from 3 to 19 strands in the completed rope. Only a few of these constructions are in general use for elevator service.

A common hoisting-rope construction is one that has 6 strands of 19 wires per strand, known as the 6×19 regular construction (Fig. 17-1). Each strand has a central wire about which is placed a layer of 6 wires. Outside the 6-wire layer is another of 12 wires, both layers being twisted in the same direction. The rope is formed by laying 6 of these strands about a hemp center, as in Fig. 17-1.

Another common construction has 6 strands of 37 wires each. Where the wires in the strands are all approximately the same size, the construction is the same as for the 19-wire strand, but with a third layer of 18 wires. This is the highest number of wires per strand used for elevator-hoisting ropes.

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UNIVERSAL

UNIVERSAL NYLON TRANSMISSION BELTINGS
TECHNICAL SPECIFICATIONS

ATTACHMENT 2

Type	Total thickness (mm)	Weight (kg/sq. mtr) Approx	Min. pulley dia (mm)	Pull for 1% elongation (kg/cm)	Tensile strength (kgs/cm)	Top surface			Driving surface			Max. temp. resistance (oC)
						Col	Mat	COF	Col	Mat	COF	
LEATHER NYLON BELTINGS												
LL-3	3.6	3.4	20	2	60	W	L	0.4	W	L	0.4	80
[illegible]	4.0	3.7	40	4	120	W	L	0.4	W	L	0.4	80
[illegible]	4.4	4.2	80	8	240	W	L	0.4	W	L	0.4	80
[illegible]	5.0	4.6	100	10	330	W	L	0.4	W	L	0.4	80
[illegible]	6.5	5.5	160	16	480	W	L	0.4	W	L	0.4	80
[illegible]	7.5	6.7	240	24	720	W	L	0.4	W	L	0.4	80
[illegible]	8.0	7.8	320	32	960	W	L	0.4	W	L	0.4	80
[illegible]	10	8.9	400	40	1200	W	L	0.4	W	L	0.4	80
[illegible]	2.2	2.0	20	2	60	R	F	0.3	W	L	0.4	80
[illegible]	2.4	2.3	40	4	120	R	F	0.3	W	L	0.4	80
[illegible]	3.1	2.8	80	8	240	R	F	0.3	W	L	0.4	80
[illegible]	3.4	3.5	100	10	330	R	F	0.3	W	L	0.4	80
[illegible]	4.8	4.0	160	16	480	R	F	0.3	W	L	0.4	80
[illegible]	6.0	4.5	240	24	720	R	F	0.3	W	L	0.4	80
[illegible]	7.3	6.3	320	32	960	R	F	0.3	W	L	0.4	80
[illegible]	8.5	7.3	400	40	1200	R	F	0.3	W	L	0.4	80
[illegible]	2.0	2.2	40	4	120	T	PS	0.2	W	L	0.4	80
[illegible]	2.8	2.8	100	10	330	T	PS	0.2	W	L	0.4	80
[illegible]	3.9	3.4	160	16	480	T	PS	0.2	W	L	0.4	80
[illegible]	5.7	6.6	40	4	120	G	NR	0.7	W	L	0.4	80
[illegible]	4.2	4.1	80	8	240	G	NR	0.7	W	L	0.4	80
[illegible]	4.5	4.5	100	10	330	G	NR	0.7	W	L	0.4	80
FABRIC NYLON BELTING												
[illegible]	0.6	0.4	10	0.5	20	R	F	0.25	R	F	0.25	80
[illegible]	0.8	0.6	20	2	60	R	F	0.25	R	F	0.25	80
[illegible]	1.0	0.9	40	4	120	R	F	0.25	R	F	0.25	80
[illegible]	1.5	1.4	80	8	240	R	F	0.25	R	F	0.25	80
[illegible]	1.6	1.4	50	4	120	R	F	0.25	G	F	0.7	80

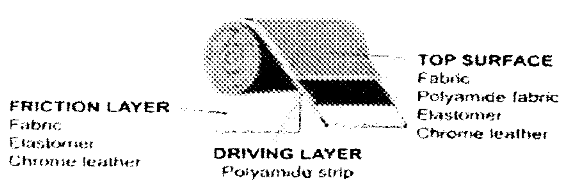
Type	Total thickness (mm)	Weight (kg/sq. mtr) Approx	Min. pulley dia (mm)	Pull for 1% elongation (kg/cm)	Tensile strength (kgs/cm)	Top surface			Driving surface			Max. temp. resistance (oC)
						Col	Mat	COF	Col	Mat	COF	
RUBBER NYLON BELTINGS												
[illegible]	2.4	3.0	40	4	120	G	NR	0.7	G	NR	0.7	100
[illegible]	2.6	3.3	80	8	240	G	NR	0.7	G	NR	0.7	100
[illegible]	2.9	3.6	100	10	330	G	NR	0.7	G	NR	0.7	100
[illegible]	6.0	6.7	100	10	330	G	NR	0.7	G	NR	0.7	100
[illegible]	3.3	4.2	160	16	480	G	NR	0.7	G	NR	0.7	100
[illegible]	3.9	4.6	220	19	570	G	NR	0.7	G	NR	0.7	100
[illegible]	2.4	3.0	40	4	120	G	NR	0.7	Y	NR	0.7	100
[illegible]	2.6	3.3	80	8	240	G	NR	0.7	Y	NR	0.7	100
[illegible]	2.9	3.6	100	10	330	G	NR	0.7	Y	NR	0.7	100
[illegible]	3.3	4.2	160	16	480	G	NR	0.7	Y	NR	0.7	100
TANGENTIAL BELTS												
[illegible]	1.8	2.0	50	5	150	PG	NR	0.7	B	NR	0.7	100
[illegible]	1.8	2.1	50	5	150	PG	NR	0.7	B	NR	0.7	100
[illegible]	2.4	3.0	100	10	300	PG	NR	0.7	B	NR	0.7	100
[illegible]	3.0	3.7	100	10	300	PG	NR	0.7	B	NR	0.7	100
[illegible]	3.2	3.9	150	15	450	PG	NR	0.7	B	NR	0.7	100
[illegible]	4.0	5.1	150	15	450	PG	NR	0.7	B	NR	0.7	100
SPINDLE TAPES												
[illegible]	0.7	0.5	10	0.5	20	B	F	0.20	W	F	0.20	80
[illegible]	0.8	0.6	10	1	30	B	F	0.20	W	F	0.20	80
[illegible]	0.9	0.7	20	2	60	B	F	0.20	W	F	0.20	80
[illegible]	0.7	0.55	10	1	30	W	F	0.20	W	F	0.20	80
[illegible]	0.8	0.65	20	2	60	W	F	0.20	W	F	0.20	80
[illegible]	1.5	1.05	20	2	60	W	F	0.20	W	F	0.20	80
[illegible]	1.0	0.9	40	4	120	W	F	0.20	W	F	0.20	80
CONDENSOR TAPES												
[illegible]	3.2	2.8	40	4	120	BR	L	0.4	BR	L	0.4	80
C[illegible]	3.2	3.2	40	4	120	BR	L	0.4	BR	L	0.4	80

Col - Colour
Mat - Material
COF - Coefficient of friction
W - White
R - Red
T - Transparent
G - Green
PG - Parrot Green

B - Black
BR - Brown
Y - Yellow
L - Leather
F - Fabric
PS - Polyamide Strip
NR - Nitrile Rubber

Tolerance
Length
500 - 5000 mm ± 0.5 %
5001 - 15000mm ± 0.3%
150001 & Abv ± 0.2%
Width
Upto 50 mm ± 1mm
51 - 100 mm ± 2 mm
101 - 500 mm ± 3mm
501 - 750 mm ± 10mm
751 - 950 mm ± 15mm
Thickness
Rubber Series ± 0.15mm
Leather Series ± 0.3 mm
ST/FF Series ± 0.05 mm

BASIC STRUCTURE



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